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ABSTRACT

This study analyzes the relative effects of two categories of variables upon the learning of a basic social science concept by a kindergarten population. Major hypotheses were: (1) Subjects receiving treatments with low degrees of irrelevant material would score significantly higher on concept-learning measures related to the task than those receiving treatments with medium and high degrees of irrelevant data, (2) Subjects receiving treatments with the greater number of negative exemplars would score significantly higher on concept-learning measures than those receiving lesser numbers, (3) Subjects receiving treatments with the greater number of negative exemplars would have an interaction effect upon learning measures. Subjects were 789,225 kindergarten children representing a cross section of Seattle's population, according to SES data. Teaching materials were cassette recordings manually synchronized with 2x2 colored slides of concept exemplars and nonexemplars shown on a slide projector. The concept "island" was taught to children in groups of two and three, and three critical attributes were delineated. Analysis of variance indicated no significant differences. The study seems to suggest that for preschool children increasing irrelevant dimensions and reducing contrast in a social science concept-learning task are not significant factors. (WY)

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The Effects of Extraneous Material
and Negative Exemplars on a Social Science
Concept-Learning Task for Pre-School Children¹

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In the past two decades, a considerable number of studies have been conducted relating to concept learning in general (see Klausmeier et. al., 1969 (a) and 1969 (b)). On the other hand, very few studies dealing with social science concepts have attempted to determine causal relationships of the nature "What are the effects of specific variable X on specific behavior Y?" (see Sax, 1969; Martorella, in press (a) and (b)).

An exploratory study was undertaken to deal with some of the basic research questions associated with instructional materials in the social studies, and as part of a broader investigation dealing with a series of micro-variables associated with concept learning. This study was designed to analyze the relative effects of two categories of variables upon the learning of a basic social science concept by a pre-school population.

Major hypotheses were that

1. Ss receiving treatments with low degrees of irrelevant material would score significantly higher on concept-learning measures related to the task than those receiving treatments with medium and high degrees of irrelevant data.
2. Ss receiving treatments with the greater number of negative exemplars would score significantly higher on concept-learning measures related to the task than those receiving lesser numbers of negative exemplars.
3. Degrees of extraneous material and ratios of negative exemplars would have an interaction effect upon learning measures.

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METHODS

Subjects

Initially, nine schools were selected randomly from all elementary schools within the Seattle, Washington Public School System (total--eighty-six schools). In turn, rosters of all the kindergarten classes within the nine schools were obtained, and from this total pool of 789,225 children were drawn at random, and assigned to one of nine different treatment groups.

All Ss ranged between sixty-five and seventy-five months of age. Cross-checking indicated that the nine schools selected represented an adequate sampling of the total city population, according to S.E.S. data. Similarly, the final experimental N represented a weighted cross-section of the total population, according to S.E.S. data.

Materials

Materials used for the treatments were cassette recordings manually synchronized with 2"x2" color slides of concept-exemplars and non-exemplars shown on a Kodak Carousel projector. Slides were taken from 35 mm pictures representing the concepts in various stages of detail and non-exemplars made by one of the investigators. A total of eighty-one slides were used in the nine treatment groups. Criteria measures for learning were presented via seven sets of four randomly placed pictures constructed from colored printed pictures.

Procedure

A basic conjunctive social science concept, "island," was selected for the experiment, and three critical attributes were delineated--"land," "water," and "all around-ness." The concept rule was "land with water all around." This concept was selected because of its correspondence to Piagetian criteria for a learning task, the simplicity of the critical attributes, and its interest potential.

A 3x3 factorial design was used for the two categories of independent variables: three degrees of extraneous material and three ratios of positive-to-negative exemplars. Slides whose surface area contained over 50% of space devoted to material other than the three critical attributes of the concept were designated "high extraneous material;" those with less than 50% were labeled "medium extraneous material." Those slides with less than 50% critical-attribute material and with a visual prompt to focus attention on relevant detail were labeled as "low extraneous material." Positive exemplars were defined as those which contained the critical attributes of the concept, island; negative exemplars were those that lacked at least one of the three critical attributes. Positive-to-negative exemplar ratios were assigned as 1:1, 3:1, and 6:1. In all cases, six positive exemplars were used in treatment groups. Taped instructions identified all slide-exemplars with the appropriate designation.

Ss were called in groups of two or three into a room adjacent to their class-room and seated with tables and a slide-projector between them. A three-minute introductory tape was played identifying the equipment, the learning task in general terms, and the need for silence and attentiveness. In an attempt to keep motivation constant, all Ss were told that they would be asked some questions based upon the slide-tape presentation, and that they would receive some candy if they were able to answer.

Each instance or non-instance of the concept was presented for a period of eight seconds, accompanied by an appropriate statement made twice: "This is a picture of an island" or "This is not a picture of an island." In each treatment sequence there appeared some combination of the two independent-variable categories, high medium or low extraneous material and 1:1, 3:1 or 6:1 exemplar ratios.

Immediately after the treatment, each subject was tested individually on the seven-item criteria measure. Each item was presented verbally, and Ss were to respond by pointing to the appropriate picture. The dependent

variable consisted of seven measures relating to critical-attribute identification, concept discrimination tasks, and concept generalization.

(Frayer et. al., 1969) The test appeared in the form of four pictures for each item, randomly assigned to a location on 8½"x11" sheets. All Ss were verbally and non-verbally reinforced after each response and given candy at the conclusion regardless of their performance. One week later the same test was administered to all Ss.

RESULTS AND IMPORTANCE

Analysis of variance indicated no significant differences between treatments on test 1 and on test 2; all null hypotheses were sustained. Irrelevant material had no significant effect upon learning as measured, nor were varying numbers of negative instances a significant factor.

Contrary to findings of other investigators working with non-social science concepts and older Ss, increasing irrelevant dimensions did not produce a significant decremental effect in learning. (Kepros and Bourne, 1966; Haygood and Stevenson, 1967; Remstad, 1969) Likewise, decreasing contrast did not significantly influence learning efficiency. (cf., Bourne and Guy, 1968)

The study seems to suggest that for pre-school children increasing irrelevant dimensions and reducing contrast in a social science concept-learning task is not a significant factor, if the concept is conjunctive, has relatively few and fairly concrete critical attributes, and is represented with a small number of exemplars.

Discussion of these points was developed, and alternate hypotheses were suggested.

TREATMENT DESCRIPTIONS	3:1 Positive- Negative Ratio	6:1 Positive- Negative Ratio	1:1 Positive- Negative Ratio
High Level of Extraneous Material	$\bar{X} = 4.5$ $S = 1.3$	$\bar{X} = 4.5$ $S = 1.2$	$\bar{X} = 4.5$ $S = 1.2$
Medium Level of Extraneous Material	$\bar{X} = 4.5$ $S = 1.2$	$\bar{X} = 4.9$ $S = 0.8$	$\bar{X} = 4.7$ $S = 1.0$
Low Level of Extraneous Material	$\bar{X} = 4.7$ $S = 1.1$	$\bar{X} = 4.7$ $S = 1.3$	$\bar{X} = 5.0$ $S = 1.0$

Table 1. Test 1 results on the seven criterion measures.

SOURCE	d.f.	M.S.	F
Treatment	8	.89	.66 n.s.
Error	207	1.36	

Table 2. Analysis of variance data for test 1.

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TREATMENT DESCRIPTIONS	3:1 Positive- Negative Ratio	6:1 Positive- Negative Ratio	1:1 Positive- Negative Ratio
High Level of Extraneous Material	$\bar{X} = 4.8$ S = 1.1	$\bar{X} = 4.5$ S = 1.0	$\bar{X} = 4.7$ S = 1.1
Medium Level of Extraneous Material	$\bar{X} = 4.8$ S = 1.3	$\bar{X} = 4.9$ S = 1.1	$\bar{X} = 4.9$ S = 1.5
Low Level of Extraneous Material	$\bar{X} = 4.7$ S = 1.1	$\bar{X} = 4.7$ S = 1.3	$\bar{X} = 5.2$ S = 1.3

Table 3. Test 2 results on the seven criterion measures.

SOURCE	d.f.	M.S.	F
Treatment	8	.80	.54 n.s.
Error	171	1.48	

Table 4. Analysis of variance data for test 2.

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